

Safety Corner

What is a black swan event?

Before the turn of the 17th century, a black swan was presumed not to exist because all historical records in England showed that swans were white; thus, anyone spoke of seeing a black swan must be lying. This changed in 1697 when a Dutch explorer discovered schools of black swans in Western Australia. The term "black swan" has since been used to describe things that you talk about, but assume would never happen.

The importance of the metaphor in safety lies with the erroneous belief that some rare accidents cannot happen and thus nothing more need to be done as any safeguard would be good enough. One must note that uncertainties in the assessed risk of a rare accident are often dominated by the uncertainties in the likelihood assessment while the severity of its consequences is generally well analyzed and predictable.

As an example, the top five nuclear black swans, Station blackout, anticipated transient without scram (ATWS), reactor vessel rupture, interfacing loss of coolant accident (Interfacing LOCA), and spent fuel pool loss of cooling, with the rarest black swan - multiple reactor accidents - had historically been believed to be extremely rare. Then, on 11 March 2011, at Fukushima Daiichi, Japan, not only one but three nuclear black swans showed up: a station blackout, a spent fuel pool accident; and a triple reactor meltdown, all occurred in one single day when none was expected.

Instead of simply dismissing rare, low-probability, high-consequence accidents based purely on their predicted low likelihood of occurrence, management should strive to look for additional cost-effective measures to prevent their occurrence and mitigate their consequence if they were to occur. This point also makes the analysis of uncertainties important.

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